



STIC Search Report

EIC 3700

STIC Database Tracking Number: 131704

TO: Michael Astorino

Location: cp2 4e04

Art Unit: 3736

Friday, September 10, 2004

Case Serial Number: 10/751821

From: John Sims

Location: EIC 3700

CP2, 2C08

Phone: 308-4836

john.sims@uspto.gov

Search Notes

Ex. Astorino:

I searched this case in a number of medical and scientific files using both STN and Dialog. Some of the results appear to relate to the method claim, but I suggest you examine all the results carefully.



STIC Search Results Feedback Form

EIC 3700

Questions about the scope or the results of the search? Contact **the EIC searcher or contact:**

**John Sims, EIC 3700 Team Leader
308-4836, CP2-2C08**

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* *Example: 3730*
- *Relevant prior art found, search results used as follows:*
- 102 rejection
 - 103 rejection
 - Cited as being of interest.
 - Helped examiner better understand the invention.
 - Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- Foreign Patent(s)
- Non-Patent Literature
(journal articles, conference proceedings, new product announcements etc.)

➤ *Relevant prior art not found:*

- Results verified the lack of relevant prior art (helped determine patentability).
- Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to STIC/EIC3700 CP2 2C08



SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Michael Astorino Examiner #: 74902 Date: 9/3/2004
 Art Unit: 3736 Phone Number 306-9067 Serial Number: 10/751,821
 Mail Box and Bldg/Room Location: CP2-4E04 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc., if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: See Attached B-6 DATA SHEET

Inventors (please provide full names): _____

Earliest Priority Filing Date: 11/6/2000

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

See chm #1

STAFF USE ONLY

	Type of Search	Vendors and cost where applicable
Searcher: <u>John Sims</u>	NA Sequence (#)	STN <input checked="" type="checkbox"/>
Searcher Phone #: <u>308-4836</u>	AA Sequence (#)	Dialog <input checked="" type="checkbox"/>
Searcher Location: <u>ELC 370D</u>	Structure (#)	Questel/Orbit _____
Date Searcher Picked Up:	Bibliographic <input checked="" type="checkbox"/>	Dr.Link _____
Date Completed: <u>09/10/04</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>40</u>	Fulltext <input checked="" type="checkbox"/>	Sequence Systems _____
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____
Online Time: <u>70</u>	Other _____	Other (specify) _____

Using nonlinear analysis to describe and forecast the patient census of an intensive care unit.

Accession number & update

1997031360 20040330

Fields available in this record: abstract, cited references.

Author(s)

Pollock-JE.

Source

Complexity and Chaos in Nursing, 1997 Summer, vol. 3, p. 23-32, (24 ref)

ISSN: 1088-7911.

Source codes

COMPLEXITY-CHAOS-NURS

Current NLM serial ID number: 9701524

Previous NLM serial ID number: SR0089072

URLs: <http://www.cinahl.com/cgi-bin/refsvc?jid=1020&accno=1997031360>.

Language

English.

Publication year

1997.

Address

San Antonio Community Hospital

TX.

Publication type

journal-article, research, tables-charts.

Descriptors

CHAOS-THEORY/*;

BED-OCCUPANCY/*;

INTENSIVE-CARE-UNITS/*.

DATA-ANALYSIS-SOFTWARE;

T-TESTS;

DESCRIPTIVE-RESEARCH;

TIME-SERIES;

HOSPITALS;

TEXAS;

LOGISTIC-REGRESSION;

LINEAR-REGRESSION;

DESCRIPTIVE-STATISTICS;

FORECASTING-RESEARCH.

Subset information

Nursing, Peer Reviewed, USA.

Abstract

This study applied statistical methods derived from nonlinear dynamics to analyzing and forecasting patient census. Daily, weekly and monthly census data ($N = 736$) for the years 1991 through 1994 were analyzed for an intensive care unit within a community hospital. The results of the nonlinear analyses using *Lyapunov* exponents, logistic regressions, capacity and correlation dimensions, phase plane maps, and return maps were compared to traditional time series analysis of the same data. Traditional analysis failed to reveal pattern in the census data while nonlinear analyses identified a complex pattern with an estimated three to six independent variables (dimensions). Characteristics of a chaotic process, including a positive *Lyapunov* exponent and a fractal structure were also identified. Forecasts using nonlinear dynamical techniques, however, were no more accurate than linear regression forecasts. The findings provided some useful insights

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for nurse administrators planning and budgeting patient care services. They include the futility of long-term forecasting, the need for contingency planning and the use of two-dimensional time series graphs and phase plane plots to enhance budget monitoring processes.

References

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Major change date

20040326.

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19/3,K/1 (Item 1 from file: 35)
DIALOG(R) File 35:Dissertation Abs Online
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01556816 ORDER NO: AAD97-16588
DESCRIBING AND FORECASTING PATIENT CENSUS: COMPARING LINEAR AND NONLINEAR ANALYSIS RESULTS

Author: POLLOCK, JANE ENGLEBRIGHT
Degree: PH.D.
Year: 1996
Corporate Source/Institution: TEXAS WOMAN'S UNIVERSITY (0925)
Source: VOLUME 57/12-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 7454. 185 PAGES

...applied statistical methods derived from chaos theory to analyzing and forecasting patient census in a hospital. Patient census data from 1991 through 1994 for an **intensive care** unit and a pediatric unit within a single community hospital were analyzed. The results of the nonlinear analysis were compared to time series analysis of...

...same data.

Traditional analysis revealed strong seasonal variation in the pediatric unit census. Traditional analysis techniques failed to identify pattern in the census of the **intensive care** unit. Nonlinear analysis identified sensitivity to initial conditions in the census data from both units. The pediatric unit was non-chaotic on most measures. The **intensive care** unit demonstrated several characteristics of a chaotic process, including a positive **Lyapunov** exponent, fractal structure, and a distinctly patterned return map.

The findings of this study suggested several strategies for nurse administrators planning and budgeting for patient...

19/3,K/2 (Item 1 from file: 34)
DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
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05717802 Genuine Article#: WT367 No. References: 45
Title: Automated ventricular tachyarrhythmia recognition: A combination of cycle length and nonlinear dynamics measurements
Author(s): Igel DA; Wilkoff BL (REPRINT)
Corporate Source: CLEVELAND CLIN EDUC FDN,DEPT CARDIOL, 9500 EUCLID AVE, CARDIOL DESK F15/CLEVELAND//OH/44106 (REPRINT); CLEVELAND CLIN EDUC FDN, DEPT CARDIOL/CLEVELAND//OH/44106; CASE WESTERN RESERVE UNIV, DEPT BIOMED ENGN/CLEVELAND//OH/44106
Journal: JOURNAL OF CARDIOVASCULAR ELECTROPHYSIOLOGY, 1997, V8, N4 (APR), P 388-397
ISSN: 1045-3873 Publication date: 19970400
Publisher: FUTURA PUBL CO, 135 BEDFORD RD, PO BOX 418, ARMONK, NY 10504-0418
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Abstract: Introduction: Cardiac monitoring devices such as external cardioverter defibrillators and **ICU** computerized ECC monitoring systems sense individual QRS complexes to detect and subclassify ventricular tachyarrhythmias. Many algorithms that evaluate ECG morphology mark individual QRS complexes so...
...Research Fronts: DIMENSION ESTIMATION OF CHAOTIC TIME-SERIES; NONLINEAR DYNAMICS; MULTICHANNEL EEG)
95-1842 001 (RADIOFREQUENCY CATHETER ABLATION; ATRIOVENTRICULAR NODAL

REENTRANT TACHYCARDIA; CLINICAL OUTCOMES)
95-2350 001 (LYAPUNOV EXPONENTS; VIBRATION LOCALIZATION IN DISORDERED
MULTISPAN BEAMS; CHAOTIC SYSTEMS; DISCRETE SIGNALS; PERIODIC TRUSSES)
95-5627 001 (CHAOS IN DELAY-DIFFERENTIAL EQUATIONS; NEURAL NETWORKS;
MACKEY-GLASS...

19/3,K/3 (Item 1 from file: 144)
DIALOG(R) File 144:Pascal
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12084350 PASCAL No.: 95-0287476

Deterministic chaos in the hemodynamics of an artificial heart

YAMBE T; NITTA S I; SONOBE T; NAGANUMA S; KAKINUMA Y; IZUTSU K; AKIHO H;
KOBAYASHI S I; OHSAWA N; NANKA S; TANAKA M; FUKUJU T; MIURA M; UCHIDA N;
SATO N; TABAYASHI K; KOIDE S; ABE K; TAKEDA H; YOSHIZAWA M
Tohoku univ., dep. medical eng. cardiology, Aoba-ku Sendai 980, Japan;
Tohoku univ., inst. development aging cancer, div. organ pathophysiology,
Aoba-ku Sendai 980, Japan; Tohoku univ., fac. eng., dep. electrical eng.,
Aoba-ku Sendai 980, Japan; Tohoku univ., graduate school information,
Aoba-ku Sendai 980, Japan

Journal: ASAIO journal : (1992), 1995, 41 (1) 84-88

Language: English

... non linear mathematical technique, the arterial blood pressure waveform was embedded into a four dimensional phase space and projected into three dimensional phase space. The **Lyapunov** numeric method is used as an adjunct to the graphic analysis of the state space. A phase portrait of the attractor showed a high dimension...

... dimensional solid torus suggesting deterministic chaos during natural circulation. However, a simple attractor, such as a limit cycle attractor, was observed during artificial circulation. Positive **Lyapunov** exponents during artificial circulation suggest the lower dimensional chaotic system. Thus, hemodynamic parameters during prosthetic circulation must be carefully controlled when unexpected stimuli are fed...

Broad Descriptors: Artiodactyla; Ungulata; Mammalia; Vertebrata;
Cardiocirculatory assistance; **Intensive care**; Artiodactyla; Ungulata;
Mammalia; Vertebrata; Assistance cardiocirculatoire; Soin intensif;
Artiodactyla; Ungulata; Mammalia; Vertebrata; Asistencia
cardiocirculatoria; Cuidado intensivo

?

24/3,K/1 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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12591754 Genuine Article#: 803KP No. References: 82

Title: Linear and nonlinear measures of blood pressure variability:
Increased chaos of blood pressure time series in patients with panic disorder

Author(s): Yeragani VK (REPRINT) ; Mallavarapu M; Radhakrishna RKA; Tancer M; Uhde T

Corporate Source: Apt 103,38,6th Cross,8th Main,RMV Extn,Sadashiva/Bangalore 560080/Karnataka/India/ (REPRINT); Wayne State Univ,Sch Med, Dept Psychiat,Detroit//MI//; Wayne State Univ,Sch Med, Dept Behav Neurosci,Detroit//MI//; Cornell Univ,Sch Med,New York//NY/10021; Indian Inst Sci,Dept Elect & Commun Engn,Bangalore 560012/Karnataka/India/

Journal: DEPRESSION AND ANXIETY, 2004, V19, N2, P85-95

ISSN: 1091-4269 Publication date: 20040000

Publisher: WILEY-LISS, DIV JOHN WILEY & SONS INC, 605 THIRD AVE, NEW YORK, NY 10158-0012 USA

Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

...Abstract: is associated with end organ damage and cardiovascular morbidity. On the other hand, a decrease in heart rate (HR) variability is associated with significant cardiovascular **mortality**. There is a strong association between cardiovascular **mortality** and anxiety. Several previous studies have shown decreased HR variability in patients with anxiety. In this study, we investigated beat-to-beat variability of systolic...

...value of BP variance corrected for mean BP divided by HR variance corrected for mean HR) were significantly higher in patients compared to controls. Largest **Lyapunov exponent** (LLE) of SBP and DBP, a measure of chaos, was significantly higher in patients in supine as well as standing postures. The ratios of LLE...

...and BP variability and a possible relative increase in sympathetic function in anxiety. This increase in BP variability may partly explain the increase in cardiovascular **mortality** in this group of patients.
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...Identifiers--HEART-RATE-VARIABILITY; ACUTE MYOCARDIAL-INFARCTION; CARDIAC AUTONOMIC CONTROL; CORONARY-ARTERY-DISEASE; POWER- **SPECTRAL - ANALYSIS** ; PERIOD VARIABILITY; ORGAN DAMAGE; ESSENTIAL-HYPERTENSION; EMBEDDING DIMENSION; **LYAPUNOV EXPONENTS**

24/3,K/2 (Item 2 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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12336735 Genuine Article#: 754BG No. References: 78

Title: Effect of nortriptyline and paroxetine on measures of chaos of heart rate time series in patients with panic disorder

Author(s): Yeragani VK (REPRINT) ; Rao R

Corporate Source: Wayne State Univ,Sch Med,Flat No 16,KCN Mansion/Bangalore 560001/Karnataka/India/ (REPRINT); Wayne State Univ,Sch Med, Dept Psychiat,Detroit//MI//; Indian Inst Sci,Dept ECE,Bangalore 560012/Karnataka/India/

Journal: JOURNAL OF PSYCHOSOMATIC RESEARCH, 2003, V55, N6 (DEC), P507-513
ISSN: 0022-3999 Publication date: 20031200

Publisher: PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD LANE,
KIDLINGTON, OXFORD OX5 1GB, ENGLAND
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Abstract: Tricyclic antidepressants have notable cardiac side effects, and this issue has become important due to the recent reports of increased cardiovascular **mortality** in patients with depression and anxiety. Several previous studies indicate that serotonin reuptake inhibitors (SRIs) do not appear to have such adverse effects. Apart from...

...13), a tricyclic, and paroxetine ($n = 16$), an SRI inhibitor, on HR variability in patients with panic disorder, using a measure of chaos, the largest **Lyapunov exponent** (LLE) using pre- and posttreatment HR time series. Our results show that nortriptyline is associated with a decrease in LLE of high frequency (HF: 0...
...Identifiers--ACUTE MYOCARDIAL-INFARCTION; CORONARY-ARTERY DISEASE;
POWER- **SPECTRAL - ANALYSIS** ; SUDDEN CARDIAC DEATH; QT INTERVAL VARIABILITY; HOLTER ECG RECORDS; PERIOD VARIABILITY; REPOLARIZATION LABILITY; EMBEDDING DIMENSION; MULTIPLE-SCLEROSIS

24/3,K/3 (Item 3 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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11534757 Genuine Article#: 665QT No. References: 86
Title: Nonlinear measures of QT interval series: novel indices of cardiac repolarization lability: MEDqthr and LLEqthr
Author(s): Yeragania VK (REPRINT) ; Rao KAR
Corporate Source: Wayne State Univ, Sch Med, Flat No 16, KCN Mans/Bangalore 560001/Karnataka/India/ (REPRINT); Wayne State Univ, Sch Med, Dept Psychiat, Detroit//MI//; Indian Inst Sci, Dept ECE, Bangalore 560012/Karnataka/India/
Journal: PSYCHIATRY RESEARCH, 2003, V117, N2 (FEB 15), P177-190
ISSN: 0165-1781 Publication date: 20030215
Publisher: ELSEVIER SCI IRELAND LTD, CUSTOMER RELATIONS MANAGER, BAY 15, SHANNON INDUSTRIAL ESTATE CO, CLARE, IRELAND
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

...Abstract: patients with panic disorder and 18 patients with major depression in supine and standing postures. We obtained the minimum embedding dimension (MED) and the largest **Lyapunov exponent** (LLE) of instantaneous heart rate (HR) and QT interval series. MED quantifies the system's complexity and LLE predictability. There was a significantly lower MED...
...suggests that this nonlinear index is a valuable addition to the linear measures. These findings may also help to explain the higher incidence of cardiovascular **mortality** in patients with anxiety and depressive disorders. (C) 2002 Elsevier Science Ireland Ltd. All rights reserved.
...Identifiers--HEART-RATE-VARIABILITY; PANIC DISORDER PATIENTS; RATE TIME-SERIES; ACUTE MYOCARDIAL-INFARCTION; CORONARY-ARTERY DISEASE; POWER- **SPECTRAL - ANALYSIS** ; PERIOD VARIABILITY; CORRELATION DIMENSION; **LYAPUNOV EXPONENTS** ; RATE DYNAMICS

24/3,K/4 (Item 4 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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09533438 Genuine Article#: 418NH No. References: 82

Title: Decreased chaos and increased nonlinearity of heart rate time series in patients with panic disorder

Author(s): Rao RKA; Yeragani VK (REPRINT)

Corporate Source: Wayne State Univ, Sch Med, Flat 16, KCN Mansion/Bangalore 560001/Karnataka/India/ (REPRINT); Indian Inst Sci, Dept ECE, Bangalore/Karnataka/India/; Wayne State Univ, Sch Med, Dept Psychiat, Detroit//MI/

Journal: AUTONOMIC NEUROSCIENCE-BASIC & CLINICAL, 2001, V88, N1-2 (APR 12) , P99-108

ISSN: 1566-0702 Publication date: 20010412

Publisher: ELSEVIER SCIENCE BV, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS

Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

...Abstract: in 30 normal control subjects and 36 age-matched patients with panic disorder in supine and standing postures. We obtained minimum embedding dimension (MED), largest **Lyapunov exponent** (LLE) and measures of nonlinearity (NL) of heart rate time series. MED quantifies system's complexity, LLE predictability and NL, deviation from linear processes. There...

...autonomic flexibility in these patients due possibly to a decrease in cardiac vagal activity. These findings may further explain the reported higher incidence of cardiovascular **mortality** in patients with anxiety disorders. (C) 2001 Elsevier Science B.V. All rights reserved.

...Identifiers--SUDDEN CARDIAC DEATH; ACUTE MYOCARDIAL-INFARCTION; POWER-SPECTRAL - ANALYSIS ; RATE-VARIABILITY; REPOLARIZATION LABILITY; PERIOD VARIABILITY; LYAPUNOV EXPONENTS ; MULTIPLE-SCLEROSIS; RATE DYNAMICS; CORRELATION DIMENSION

24/3,K/5 (Item 5 from file: 34)

DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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09517658 Genuine Article#: 415TY No. References: 48

Title: Heart rate and QT variability in children with anxiety disorders: A preliminary report

Author(s): Yeragani VK (REPRINT) ; Rao KAR; Pohl R; Jampala VC; Balon R

Corporate Source: Flat 16, KCN Mans/Bangalore 560001/Karnataka/India/ (REPRINT); Wayne State Univ, Sch Med, Dept Psychiat, Detroit//MI/; Vet Affairs Med Ctr, Dayton//OH/; Indian Inst Bangalore, Dept ECE, Bangalore/Karnataka/India/

Journal: DEPRESSION AND ANXIETY, 2001, V13, N2, P72-77

ISSN: 1091-4269 Publication date: 20010000

Publisher: WILEY-LISS, DIV JOHN WILEY & SONS INC, 605 THIRD AVE, NEW YORK, NY 10158-0012 USA

Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

...Abstract: QT over heart rate variability normalized for mean heart rate were significantly higher in children with anxiety compared to controls ($P<0.05$). The largest **Lyapunov Exponent** (LLE) of heart rate time series was significantly lower ($P<0.05$) in children with anxiety compared to controls. These findings suggest a relative increase...

...Identifiers--POWER-SPECTRAL - ANALYSIS ; SUDDEN CARDIAC DEATH; RATE TIME-SERIES; PANIC DISORDER; PERIOD VARIABILITY; MULTIPLE-SCLEROSIS; REPOLARIZATION LABILITY; NONLINEAR DYNAMICS; AUTONOMIC FUNCTION; MENTAL STRESS

24/3,K/6 (Item 1 from file: 144)

DIALOG(R)File 144:Pascal

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16038018 PASCAL No.: 03-0185905

Nonlinear measures of QT interval series: novel indices of cardiac repolarization lability: MEDqthr and LLEqthr

VIKRAM KUMAR YERAGANI; RADHAKRISHNA RAO K A

Department of Psychiatry, Wayne State University School of Medicine,
Detroit, MI, United States; Department of ECE, Indian Institute of Science,
Bangalore, India

Journal: Psychiatry research, 2003, 117 (2) 177-190

Language: English

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... patients with panic disorder and 18 patients with major depression in supine and standing postures. We obtained the minimum embedding dimension (MED) and the largest **Lyapunov exponent** (LLE) of instantaneous heart rate (HR) and QT interval series. MED quantifies the system's complexity and LLE predictability. There was a significantly lower MED...

... suggests that this nonlinear index is a valuable addition to the linear measures. These findings may also help to explain the higher incidence of cardiovascular **mortality** in patients with anxiety and depressive disorders.

English Descriptors: Panic; Posture; Comparative study; Depression;
Evaluation; Time series; Electrocardiography; Heart rate; QT interval;
Hemodynamics; **Spectral analysis**; Chaos; Autonomic nervous system;
Methodology; Human

French Descriptors: Panique; Posture; Etude comparative; Etat depressif;
Evaluation; Serie temporelle; Electrocardiographie; Rythme cardiaque;
Intervalle QT; Hemodynamique; **Analyse spectrale**; Chaos; Systeme
nerveux autonome; Methodologie; Homme

?

17/3,K/1 (Item 1 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online
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01385036 ORDER NO: AAD94-32463
HAMILTONIAN DYNAMICS AND CHAOTIC BEHAVIOR OF YANG-MILLS FIELDS ON A LATTICE
Author: GONG, CHENGQIAN
Degree: PH.D.
Year: 1994
Corporate Source/Institution: DUKE UNIVERSITY (0066)
Source: VOLUME 55/07-B OF DISSERTATION ABSTRACTS INTERNATIONAL.
PAGE 2812. 215 PAGES

As a non-trivial generalization of the electromagnetism, a Yang-Mills theory possesses non-perturbative properties which render the theory extremely difficult to **analyze**. One way to achieve some understanding is to use the semi-classical method, which consists of two approaches: one approach is to solve the field...

...evolution of a gauge configuration that cannot be integrated analytically. It is found that in the SU(2) gauge theory there exists a universal largest **Lyapunov** exponent, which **survives** in the continuum limit for almost any random initial condition. In other words, the phase space of the classical Yang-Mills fields is almost completely...

...U(1) and the $\lambda\phi^4$ theories are regular in the continuum limit. In the simple case of the SU(2) theory, the complete **Lyapunov spectrum** is obtained and it is found that one-third of the exponents are zeros. The latter implies that there are no conserved physical quantities in...

...is shown that while the former are stable against small fluctuations, the latter are unstable and their instability can be characterized again by a largest **Lyapunov** exponent that **survives** in the continuum limit.

The chaoticity and instability found in a Yang-Mills theory provides an understanding of the rapid thermalization in a highly excited...

17/3,K/2 (Item 2 from file: 35)
DIALOG(R)File 35:Dissertation Abs Online
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01179217 ORDER NO: AAD13-43530
AN EXAMINATION OF SOME PROPERTIES OF NONLINEAR DYNAMICAL SYSTEMS
Author: WRIGHT, EDWARD D.
Degree: M.S.
Year: 1990
Corporate Source/Institution: UNIVERSITY OF LOUISVILLE (0110)
Source: VOLUME 29/04 of MASTERS ABSTRACTS.
PAGE 672. 129 PAGES

Two nonlinear, conservative Hamiltonian systems, inspired by known celestial models, were **analyzed**.

The first model consisted of a test mass orbiting a massive oblate spheroid. The **Lyapunov spectrum** of this system was calculated and compared to the **spectrum** of the classic two-body system with similar initial conditions. The **Lyapunov spectrum** of the classic two-body system is known to be entirely zero. The numerical values of both **spectra** were similar to within 8%. The similarity between the calculated **spectra** is taken to imply the **Lyapunov spectrum** of the oblate system is also

entirely zero.

The second model was a modified restricted three-body system. The **Lyapunov spectra** for trajectories using a negligible test mass were compared against similar trajectories which had a non-negligible test mass. Surveys concerned with the **survivability** of a given trajectory for a given time interval about the binary were also generated. (Abstract shortened with permission of author.)

17/3,K/3 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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07774270 Genuine Article#: 207JR No. References: 33
Title: Chaos and spectral analyses of heart rate variability during head-up tilting in essential hypertension
Author(s): Kagiyama S (REPRINT) ; Tsukashima A; Abe I; Fujishima S; Ohmori S; Onaka U; Ohya Y; Fujii K; Tsuchihashi T; Fujishima M
Corporate Source: KYUSHU UNIV, FAC MED, DEPT INTERNAL MED 2, HIGASHI KU, MAIDASHI 3-1-1/FUKUOKA 8128582//JAPAN/ (REPRINT)
Journal: JOURNAL OF THE AUTONOMIC NERVOUS SYSTEM, 1999, V76, N2-3 (MAY 28), P153-158
ISSN: 0165-1838 Publication date: 19990528
Publisher: ELSEVIER SCIENCE BV, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Chaos and spectral analyses of heart rate variability during head-up tilting in essential hypertension
Abstract: To investigate nonlinear and linear components of heart rate variability (HRV) in essential hypertension (EHT), we **analyzed** HRV by chaos and **spectral analyses** in patients with EHT ($n = 18$) and normotensives ($n = 10$) during head-up tilting. We used the correlation dimension (CD) and **Lyapunov** exponents as the parameters of chaos. The CD, an index of complexity, was lower at rest in EHT group than in normotensives, and did not change in EHT group in response to head-up tilting, but decreased in normotensives. Head-up tilting did not change the **Lyapunov** exponents, an index of sensitive dependence on initial condition, a hallmark of chaos, in both groups. In the **spectral analysis**, the normalized high-frequency component (%HF) was decreased in EHT group at rest, and head-up tilting increased the low- to high-frequency ratio (L/H) and reduced the %HF in both groups. The CD and **Lyapunov** exponents at rest were correlated with the %HF and L/H. These results suggest that chaos **analysis** can assess the different aspect of HRV from **spectral analysis** and that nonlinear components of HRV may be associated with hypertension through an impaired dynamic regulation of HRV. (C) 1999 Elsevier Science B.V. All...
...Identifiers--ACUTE MYOCARDIAL-INFARCTION; NONLINEAR DYNAMICS; STRANGE ATTRACTORS; CARDIOLOGY; MORTALITY; EXERCISE; TIME

17/3,K/4 (Item 2 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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05637208 Genuine Article#: WM482 No. References: 20
Title: Prediction error method for second-order blind identification
Author(s): AbedMeraiq K (REPRINT) ; Moulines E; Loubaton P
Corporate Source: UNIV MELBOURNE, DEPT ELECT & ELECT ENGN/PARKVILLE/VIC 3052/AUSTRALIA/ (REPRINT); ECOLE NATL SUPER TELECOMUN, DEPT SIGNAL/F-75634 PARIS 13//FRANCE/; UNIV MARNE LA VALLEE, UNITE FORMAT

SPI/F-93166 NOISY LE GRAND//FRANCE/
Journal: IEEE TRANSACTIONS ON SIGNAL PROCESSING, 1997, V45, N3 (MAR), P
694-705
ISSN: 1053-587X Publication date: 19970300
Publisher: IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, 345 E 47TH ST,
NEW YORK, NY 10017-2394
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Prediction error method for second-order blind identification
...Abstract: output are a problem of current theoretical and practical interest. In this paper, we introduce a second-order blind identification technique based on a linear **prediction** approach. In contrast to eigenstructure-based methods, it will be shown that the linear **prediction** error method is ''robust'' to order overdetermination.

An asymptotic performance **analysis** of the proposed estimation method is carried out, consistency and asymptotic normality of the estimates is established. A closed-form expression for the asymptotic covariance...

Research Fronts: 95-0441 001 (CAPTURE-RECAPTURE DATA; SURVIVAL RATES; MODEL SELECTION CRITERIA; ROOT VOLES; WESTERN NORTH-ATLANTIC; LIFE-HISTORY STRATEGY)
95-3378 001 (VECTOR AUTOREGRESSIVE MOVING AVERAGE MODELS; DYNAMIC SPECTRAL - ANALYSIS ; COVARIANCE FUNCTION; MULTIVARIATE ARMA PROCESSES)
95-4137 001 (REDUNDANTLY ACTUATED SYSTEMS; NUMERICAL DESIGN APPROACH; TRANSFER-FUNCTION MATRICES; MULTIVARIABLE CONTROLLER)
95-6900 001 (LYAPUNOV EQUATIONS; WORST-CASE IDENTIFICATION; SINGULAR-VALUE DECOMPOSITION; QUOTIENT STRUCTURES IN C-ALGEBRAS; REVERSE FORMS OF A CONVEX MATRIX INEQUALITY)

17/3,K/5 (Item 3 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

05553068 Genuine Article#: WG097 No. References: 54
Title: Nonlinear deterministic analysis of tissue texture: A stereological study on mastopathic and mammary cancer tissue using chaos theory
Author(s): Mattfeldt T (REPRINT)
Corporate Source: UNIV ULM,DEPT PATHOL, OBERER ESELSBERG M23/D-89081 ULM//GERMANY/ (REPRINT)
Journal: JOURNAL OF MICROSCOPY-OXFORD, 1997, V185, 1 (JAN), P47-66
ISSN: 0022-2720 Publication date: 19970100
Publisher: BLACKWELL SCIENCE LTD, OSNEY MEAD, OXFORD, OXON, ENGLAND OX2 0EL
Language: English Document Type: ARTICLE (ABSTRACT AVAILABLE)

Title: Nonlinear deterministic analysis of tissue texture: A stereological study on mastopathic and mammary cancer tissue using chaos theory
...Abstract: chaos, we present a deterministic approach to the study of epithelial tissue texture. Methods for estimation of the autocorrelation function, for evaluation of the power **spectrum**, for attractor reconstruction, for estimation of the **Lyapunov** exponent and of the correlation dimension, and for the generation of surrogate data sets are outlined. In our biological example, these methods are applied to 20 cases of mastopathy as compared to 20 cases of mammary cancer. The input signals for the **analysis** were estimates of epithelial fraction measured at low magnification within 5100 equally spaced line segments per case perpendicular to an arbitrarily directed axis.

existence of...
...Identifiers--TIME-SERIES; CORRELATION DIMENSION; 2ND-ORDER STEREOLOGY;
STRANGE ATTRACTORS; STOCHASTIC-SYSTEMS; BREAST-CANCER; **SPECTRA**; EEG
...Research Fronts: LASER DYNAMICS; CHAOTIC SYSTEMS; LORENZ-HAKEN MODEL;
RING CAVITY)
95-1585 001 (UNBIASED STEREOLOGICAL METHODS; RAT CEREBELLUM; PERMANENT
NEURONAL CELL LOSS; NUCLEAR VOLUME; QUANTITATIVE IMMUNOHISTOCHEMICAL
ANALYSIS ; CAPILLARY LENGTH)
95-4365 001 (SPATIAL PATTERNS; STROKE **MORTALITY** ; FINE-SCALE
GENETIC-STRUCTURE OF A TURKEY OAK FOREST)
95-5115 001 (MORPHOLOGICAL OPERATIONS; SPATIAL STATISTICS; RANDOM
CLOSED-SETS; OPTICAL IMPLEMENTATION)

17/3,K/6 (Item 4 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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04834861 Genuine Article#: UL072 No. References: 38
**Title: CHAOS-RELATED DETERMINISTIC REGULATION OF HEART-RATE-VARIABILITY IN
TIME AND FREQUENCY DOMAINS - EFFECTS OF AUTONOMIC BLOCKADE AND EXERCISE**
Author(s): HAGEMAN I; BERGLUND M; LORIN M; NOWAK J; SYLVEN C
Corporate Source: HUDDINGE UNIV HOSP, KAROLINSKA INST, DEPT CARDIOL/S-14186
HUDDINGE//SWEDEN//; HUDDINGE HOSP, KAROLINSKA INST, DEPT TECH
ASSISTANCE/S-14186 HUDDINGE//SWEDEN//; HUDDINGE UNIV HOSP, KAROLINSKA
INST, DEPT CLIN PHYSIOL/S-14186 HUDDINGE//SWEDEN//
Journal: CARDIOVASCULAR RESEARCH, 1996, V31, N3 (MAR), P410-418
ISSN: 0008-6363
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: 40% and at 70% of maximal working capacity, Heart rate
variability was assessed by: local sensitive dependence on initial
conditions as quantitated by the dominant **Lyapunov** exponent,
coefficient of variation of heart rate, power **spectral analysis** of
high- and low-frequency bands and the 1/f-slope of the
very-low-frequency band and time domain **analysis**, Results: The
approximate dominant **Lyapunov** exponent was positive at rest and
remained positive during autonomic blockade and during exercise, The
exponent decreased significantly with propranolol + atropine and even
more so during exercise but did not attain zero, At baseline
approximate **predictability** was lost after about 30 s whereas after
autonomic blockade or exercise it was lost after about 60 s. The
1/f-slope remained unaltered...

...has characteristics suggestive of low-dimensional chaos-like determinism
which is modulated but not eliminated by inhibition of autonomic tone
or by exercise. The dominant **Lyapunov** exponent characterises heart
rate variability independent of the other investigated measures.
...Identifiers--MYOCARDIAL-INFARCTION; POWER **SPECTRUM** ; FLUCTUATION;
MORTALITY; PERIOD; BEAT
Research Fronts: 94-0468 006 (HEART-RATE-VARIABILITY IN ACUTE
MYOCARDIAL-INFARCTION; CARDIAC AUTONOMIC TONE; POWER **SPECTRAL** -
ANALYSIS ; CORONARY-ARTERY DISEASE)
94-2270 001 (CHAOTIC TIME-SERIES; NONLINEAR DYNAMICS; GENERATING
SURROGATE DATA)

17/3,K/7 (Item 5 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

03859430 Genuine Article#: QL988 No. References: 43
Title: APPLICATION OF THE POINCARE PLOT TO HEART-RATE-VARIABILITY - A NEW MEASURE OF FUNCTIONAL STATUS IN HEART-FAILURE
Author(s): KAMEN PW; TONKIN AM
Corporate Source: AUSTIN HOSP, DEPT CARDIOL/MELBOURNE/VIC 3084/AUSTRALIA/
Journal: AUSTRALIAN AND NEW ZEALAND JOURNAL OF MEDICINE, 1995, V25, N1 (FEB), P18-26
ISSN: 0004-8291
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Abstract: Background: Conventional methods of quantifying heart rate variability using summary statistics have shown that decreased variability is associated with increased **mortality** in heart failure. However, many patients with heart failure have arrhythmias which make the 'raw' heart rate variability data less suitable for the use of...

...in heart failure also produced data which were normally distributed but the remaining seven produced data which required careful filtering to make them suitable for **analysis** using summary statistics, but which could be **analysed** by the Poincare plot.

Conclusions: The Poincare plot pattern is a semi-quantitative tool which can be applied to the **analysis** of R-R interval data. It has potential advantages in that it allows assessment of data which are grossly non-Gaussian in distribution, and is...

...Identifiers--ACUTE MYOCARDIAL-INFARCTION; R-R INTERVALS; PLASMA NOREPINEPHRINE; PACEMAKER ACTIVITY; VAGAL-STIMULATION; **SPECTRAL - ANALYSIS**; SINOATRIAL NODE; ARRHYTHMIA; RECORDINGS; PROGNOSIS

...Research Fronts: LIFE-THREATENING VENTRICULAR TACHYARRHYTHMIAS; ACUTE MYOCARDIAL-INFARCTION)

93-3247 002 (CHRONIC HEART-FAILURE; MYOCARDIAL BETA-ADRENERGIC RECEPTORS; SYMPATHETIC MECHANISMS)

93-2283 001 (CHAOTIC TIME-SERIES; **LYAPUNOV** EXPONENTS; NONLINEAR DYNAMICS; ATTRACTOR DIMENSION)

93-3152 001 (ACUTE MYOCARDIAL-INFARCTION; LEFT-VENTRICULAR REMODELING; CHRONIC HEART-FAILURE; ANGIOTENSIN-CONVERTING ENZYME-INHIBITORS; EARLY USE OF CAPTOPRIL)

17/3,K/8 (**Item 6 from file: 34**)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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02721288 Genuine Article#: LY549 No. References: 51
Title: POPULATION CONSEQUENCES OF LARVAL CROWDING IN THE DRAGONFLY AESHNA-JUNCEA

Author(s): VANBUSKIRK J
Corporate Source: INST ECOSYST STUDIES, BOX AB/MILLBROOK//NY/12545; DUKE UNIV, DEPT ZOOL/DURHAM//NC/27706
Journal: ECOLOGY, 1993, V74, N7 (OCT), P1950-1958
ISSN: 0012-9658
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: USA, showed clear evidence of competition when natural densities were high. After 2 yr of larval growth, individuals in crowded pools were developmentally delayed and **survived** less well than individuals in sparsely populated pools. The stunted larvae caught up with individuals in less crowded pools and reached the final instar in...

...field experiment in natural pools demonstrated the causal connection between density and fitness: feeding activity and growth rates were significantly reduced under crowded conditions, but **survival** showed no response to density. In unmanipulated rock pools, however, natural increases in density from one year to the next were met with slightly overcompensatory decreases in annual **survival**. The results illustrate that density dependence operates in a way that could contribute to population regulation in *A. juncea*, and a 6-yr time series...

...Research Fronts: LIFE-HISTORY)

91-0966 001 (METAPOPULATION DYNAMICS; HIERARCHICALLY ORGANIZED SYSTEMS; INTERSPECIFIC COMPETITION; NEED FOR NICHES; PREDATOR-PREY PATCH MODELS; COMMUNITY ECOLOGY)

91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; **LYAPUNOV SPECTRUM**)

91-5768 001 (SPRUCE BUDWORM; INSECT POPULATIONS; TIME-VARYING **SURVIVAL RATES**)

91-6042 001 (BENTHIC INVERTEBRATE COMMUNITY STRUCTURE; DETECTING HUMAN IMPACTS IN MARINE ENVIRONMENTS; DRIFT RESPONSES; LARVAL BLACK FLIES; FIELD POPULATIONS)

17/3,K/9 (Item 7 from file: 34)

DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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02662079 Genuine Article#: LU751 No. References: 70

Title: POSITIVE FEEDBACK IN AQUATIC ECOSYSTEMS - THE CASE OF THE MICROBIAL LOOP

Author(s): STONE L; BERMAN T

Corporate Source: ISRAEL OCEANOGR & LIMNOL RES,YIGAL ALLON KINNERET LIMNOL LAB, POB 345/IL-14102 TIBERIAS//ISRAEL//; WEIZMANN INST SCI,DEPT ENVIRONM SCI & ENERGY RES/IL-76100 REHOVOT//ISRAEL/

Journal: BULLETIN OF MATHEMATICAL BIOLOGY, 1993, V55, N5 (SEP), P919-936

ISSN: 0092-8240

Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Research Fronts: 91-1474 001 (FECAL BACTERIA; MICROBIAL LOOP; NONCULTURABLE VIBRIO-VULNIFICUS CELLS; **SURVIVAL** OF CAMPYLOBACTERS; LAKE WATER; POLYMERASE CHAIN-REACTION; SEASONAL PATTERNS)

91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; **LYAPUNOV SPECTRUM**)

91-5401 001 (ANAEROBIC CILIATES; EUTROPHIC LAKE; HETEROTROPHIC FRESH-WATER NANOFAGELLATES; ENDOSYMBIOTIC METHANOGENIC BACTERIA; MICROBIAL COMMUNITIES)

91-7543 001 (SHIFTING MOSAIC LANDSCAPE; POPULATION STABILITY; PREY...)

17/3,K/10 (Item 8 from file: 34)

DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02624488 Genuine Article#: LR324 No. References: 23

Title: DYNAMICS OF FISH POPULATIONS WITH DIFFERENT COMPENSATORY PROCESSES WHEN SUBJECTED TO RANDOM SURVIVAL OF EGGS AND LARVAE

Author(s): JENSEN AL

Corporate Source: UNIV MICHIGAN,SCH NAT RESOURCES/ANN ARBOR//MI/48109

Journal: ECOLOGICAL MODELLING, 1993, V68, N3-4 (AUG), P249-256

ISSN: 0304-3800

Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Title: DYNAMICS OF FISH POPULATIONS WITH DIFFERENT COMPENSATORY PROCESSES WHEN SUBJECTED TO RANDOM SURVIVAL OF EGGS AND LARVAE

...Abstract: is widely believed that abundance of fish populations is determined during the larval stage, for larval abundance is high, there is high variability in larval **survival**, and small changes in larval abundance could have large effects on population abundance. In this study, hypothesized population regulation processes were quantified in a mathematical model that was applied to study the importance of compensatory processes during the larval stage by replacing them with random **survival**. The hypothesized population regulation processes were food-limited growth, size-dependent **mortality**, and age at maturity dependent on size. Variation in population abundance resulting from variation in egg and larval **survival** depends on the population regulation process. In populations where **mortality** depends on size of individuals, variation in **survival** of young has little effect on abundance of adults. If age at maturity is flexible, variation in **survival** of young causes large fluctuations in abundance and the fluctuations follow a pattern of occasional large year classes that are slowly attrited over their lifespans. If age at maturity is not flexible, and if **mortality** is not size dependent, variation in **survival** of young causes population abundance to fluctuate widely without a clear pattern. Compensation during the larval life stage was not necessary for regulation of fish...

...Research Fronts: 001 (LARVAL GROWTH OF A MARINE FISH; WINTER FLOUNDER PSEUDOPLEURONECTES-AMERICANUS REPRODUCTIVE SUCCESS; FEMALE SIZE; FLUIDIZED-BED REACTOR; EARLY LIFE-HISTORY)

91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; **LYAPUNOV SPECTRUM**)

17/3,K/11 (Item 9 from file: 34)
DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02624486 Genuine Article#: LR324 No. References: 13

Title: OSCILLATORY BEHAVIOR IN A RESOURCE-BASED PLANT-HERBIVORE MODEL WITH RANDOM HERBIVORE ATTACK

Author(s): SARKAR AK; ROY AB
Corporate Source: JADAVPUR UNIV,DEPT MATH/CALCUTTA 700032/W BENGAL/INDIA/
Journal: ECOLOGICAL MODELLING, 1993, V68, N3-4 (AUG), P213-226
ISSN: 0304-3800
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: rate of external resources and the ratio of parameters which take into account the loss of plant biomass due to grazing, litterfall and the herbivore **mortality** rate play an important role in shaping the dynamics of the plant-herbivore system. The criteria for existence of small- and large-amplitude non-constant...

Research Fronts: 91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; **LYAPUNOV SPECTRUM**)

91-4342 001 (PERIODIC-SOLUTIONS OF SOME NONLINEAR FUNCTIONAL-DIFFERENTIAL EQUATIONS; INFINITE DELAY; GLOBAL STABILITY THEOREM)

91-7543 001 (SHIFTING MOSAIC LANDSCAPE; POPULATION STABILITY; PREY...)

17/3,K/12 (Item 10 from file: 34)
DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02624131 Genuine Article#: LR541 No. References: 54

Title: AVOIDING ERRONEOUSLY HIGH-LEVELS OF DETECTION IN COMBINATIONS OF SEMI-INDEPENDENT TESTS - AN APPLICATION TO TESTING FOR DENSITY-DEPENDENCE

Author(s): HOLYOAK M; CROWLEY PH

Corporate Source: UNIV LONDON IMPERIAL COLL SCI & TECHNOL, NERC, CTR POPULAT BIOL, SILWOOD PK/ASCOT SL5 7PY/BERKS/ENGLAND/; UNIV KENTUCKY, T H MORGAN SCH BIOL SCI, CTR EVOLUT ECOL/LEXINGTON//KY/40506

Journal: OECOLOGIA, 1993, V95, N1 (AUG), P103-114

ISSN: 0029-8549

Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: s test produced a greater level of detection (21.5%) than any other single test or combination of tests. These results were confirmed by the **analysis** of modelled density dependent data. Although the increase in power of combinations of tests over single tests is small with the data we used, the...

Research Fronts: 91-5768 002 (SPRUCE BUDWORM; INSECT POPULATIONS; TIME-VARYING SURVIVAL RATES)

91-2038 001 (LOCAL PREDICTION OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

17/3,K/13 (Item 11 from file: 34)

DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02560272 Genuine Article#: LM683 No. References: 37

Title: CHAOS REDUCES SPECIES EXTINCTION BY AMPLIFYING LOCAL-POPULATION NOISE

Author(s): ALLEN JC; SCHAFER WM; ROSKO D

Corporate Source: UNIV FLORIDA, DEPT ENTOMOL & NEMATOL/GAINESVILLE//FL/32611 ; UNIV ARIZONA, DEPT ECOL & EVOLUTIONARY BIOL/TUCSON//AZ/85721

Journal: NATURE, 1993, V364, N6434 (JUL 15), P229-232

ISSN: 0028-0836

Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: In fact, rarity is not a necessary consequence of complex dynamical behaviour^{26,27}. But even when chaos is associated with frequent rarity, its consequences to **survival** are necessarily deleterious only in the case of species composed of a single population. Of course, the majority of real world species (for example, most...).

Research Fronts: 91-2038 003 (LOCAL PREDICTION OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

91-0838 001 (LARVAL GROWTH OF A MARINE FISH; WINTER FLOUNDER PSEUDOPLEURONECTES-AMERICANUS REPRODUCTIVE SUCCESS; FEMALE SIZE; FLUIDIZED-BED REACTOR; EARLY LIFE-HISTORY)

91-0916...

17/3,K/14 (Item 12 from file: 34)

DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02453398 Genuine Article#: LC806 No. References: 167

Title: MEASURING CHAOS IN THE BRAIN - A TUTORIAL REVIEW OF NONLINEAR DYNAMIC EEG ANALYSIS

Author(s): PRITCHARD WS; DUKE DW

Corporate Source: RJ REYNOLDS TOBACCO CO, BOWMAN GRAY TECH CTR, BIOBEHAV RES & DEV/WINSTON SALEM//NC/27102; FLORIDA STATE UNIV, SUPERCOMP COMP RES INST/TALLAHASSEE//FL/32306; FLORIDA STATE UNIV, DEPT PHYS/TALLAHASSEE//FL/32306

Journal: INTERNATIONAL JOURNAL OF NEUROSCIENCE, 1992, V67, N1-4, P31-80

ISSN: 0020-7454

Language: ENGLISH Document Type: ARTICLE

Title: MEASURING CHAOS IN THE BRAIN - A TUTORIAL REVIEW OF NONLINEAR DYNAMIC EEG ANALYSIS

...Identifiers--GRASSBERGER-PROCACCIA ALGORITHM; ESTIMATING ATTRACTOR DIMENSIONS; SINGULAR-VALUE DECOMPOSITION; TIME-SERIES; STRANGE ATTRACTORS; LYAPUNOV EXPONENTS; FRACTAL DIMENSION; DETERMINISTIC CHAOS; EMBEDDING DIMENSION; EFFICIENT ALGORITHM

Research Fronts: 91-2038 007 (LOCAL PREDICTION OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

91-0442 001 (SELF-ORGANIZED CRITICALITY; DETERMINISTIC SANDPILE MODEL; EARTHQUAKE FAULT)

91-0754 001 (NEURAL NETWORKS; LOCAL LEARNING PRESCRIPTION FOR ARBITRARY CORRELATED PATTERNS; STATISTICAL-MECHANICAL...)

...001 (TELEVISION VIEWING; CONSTRUCTION OF SOCIAL-REALITY; HEAVY-METAL MUSIC)

91-1593 001 (GENERAL RANDOM REPAIR COST FOR A MULTIUNIT SYSTEM; PERIODIC REPLACEMENT MODEL; BIVARIATE SURVIVAL FUNCTION; COMPETING RISKS; FUZZY RELIABILITY)

91-2305 001 (INTELLIGENCE IN JAPANESE CHILDREN; RT PARADIGM; INFORMATION-PROCESSING SPEED INDEXES)

91-4092 001 (NEURAL NETWORKS; EXPERT SYSTEMS...)

17/3, K/15 (Item 13 from file: 34)
DIALOG(R) File 34: SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02431399 Genuine Article#: LA842 No. References: 53

Title: SEASONALITY AND CHAOS IN A PLANKTON FISH MODEL

Author(s): DOVERI F; SCHEFFER M; RINALDI S; MURATORI S; KUZNETSOV Y

Corporate Source: POLITECN MILAN, INFORMAT TERR & AMBIENTALE LAB/I-20133 MILAN//ITALY//; INST INLAND WATER MANAGEMENT & WASTE WATER TREATMENT/LELYSTAD//NETHERLANDS//; POLITECN MILAN, CIRITA/I-20133 MILAN//ITALY//; POLITECN TURIN/I-10128 TURIN//ITALY//; RUSSIAN ACAD SCI, CTR RES COMP/PUSHCHINO//RUSSIA/

Journal: THEORETICAL POPULATION BIOLOGY, 1993, V43, N2 (APR), P159-183

ISSN: 0040-5809

Language: ENGLISH Document Type: ARTICLE

Research Fronts: 91-2038 002 (LOCAL PREDICTION OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

91-0838 001 (LARVAL GROWTH OF A MARINE FISH; WINTER FLOUNDER PSEUDOPLEURONECTES-AMERICANUS REPRODUCTIVE SUCCESS; FEMALE SIZE; FLUIDIZED-BED REACTOR; EARLY LIFE-HISTORY)

91-1221...

...ORBITS; SYSTEMS OF COUPLED OSCILLATORS; TRAVELING WAVES; GLOBAL BIFURCATIONS; CYLINDRICAL MANIFOLDS IN PHASE-SPACE; LOBE AREA)

91-5768 001 (SPRUCE BUDWORM; INSECT POPULATIONS; TIME-VARYING SURVIVAL RATES)

91-5907 001 (LAKE CONSTANCE; PHYTOPLANKTON SEASONAL SUCCESSION; ZOOPLANKTON DYNAMICS; DAPHNIA GROWTH; PHOSPHORUS CYCLE; RESOURCE

COMPETITION)
91-5942 001 (SIZE-BASED DYNAMICS OF PLANKTON...

17/3,K/16 (Item 14 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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02318497 Genuine Article#: KT665 No. References: 35
Title: NEW INSIGHTS INTO TESTING FOR DENSITY DEPENDENCE
Author(s): HOLYOAK M
Corporate Source: UNIV LONDON IMPERIAL COLL SCI & TECHNOL,DEPT BIOL,SILWOOD
PK/ASCOT SL5 7PY/BERKS/ENGLAND/
Journal: OECOLOGIA, 1993, V93, N3 (MAR), P435-444
ISSN: 0029-8549
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: were significantly ($P<0.001$) greater than the generally accepted 5% level of type I errors and so these methods are not suitable for the **analysis** of time-series data for density dependence. Levels of spurious detection (from random-walk data) were around the 5% level and hence were acceptable for...

...the intrinsic growth rate and the density dependent parameter alpha it is unclear whether this is because of variation in the strength of density dependent **mortality** or reproduction per se. However, small values of the intrinsic growth rate cause the amount of variation in the data to become small, which might...

Research Fronts: 91-5768 003 (SPRUCE BUDWORM; INSECT POPULATIONS;
TIME-VARYING **SURVIVAL** RATES)
91-5833 002 (GENERALIZED ESTIMATING EQUATIONS FOR CORRELATED BINARY
DATA; NONLINEAR RANDOM EFFECTS MODELS; CLUSTERED CATEGORICAL RESPONSES;
CATTLE DYSTOCIA)
91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR
DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV **SPECTRUM**)

17/3,K/17 (Item 15 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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02316700 Genuine Article#: KU055 No. References: 28
**Title: PHENOMENON OF LIFE-SPAN INSTABILITY IN DROSOPHILA-MELANOGASTER .2.
CHANGE IN RHYTHM OF NATURAL VARIATIONS OF LIFE-SPAN AFTER SINGLE
EXPOSURE TO GAMMA-IRRADIATION**
Author(s): IZMAYLOV DM; OBUKHOVA LK; OKLADNOVA OV; AKIFYEV AP
Corporate Source: RUSSIAN ACAD SCI,INST CHEM PHYS,KOSYGIN ST 4/MOSCOW
117977//RUSSIA/
Journal: EXPERIMENTAL GERONTOLOGY, 1993, V28, N2 (MAR-APR), P181-194
ISSN: 0531-5565
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: after a single exposure to Co-60 gamma-quantum irradiation. It has been shown using mathematical procedures that in all postirradiation generations, with one exception, **survival** curves retain their canonical shape. This is indicative of the unchangeable nature of LS distribution. The mean LS of the progeny of irradiated parents either...
Research Fronts: 91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES;
NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV **SPECTRUM**)

17/3,K/18 (Item 16 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02316699 Genuine Article#: KU055 No. References: 26
Title: PHENOMENON OF LIFE-SPAN INSTABILITY IN DROSOPHILA-MELANOGASTER .1.
NONRANDOM ORIGIN OF LIFE-SPAN VARIATIONS IN SUCCESSIVE GENERATIONS
Author(s): IZMAYLOV DM; OBUKHOVA LK; OKLADNOVA OV; AKIFYEV AP
Corporate Source: RUSSIAN ACAD SCI,INST CHEM PHYS,KOSYGIN ST 4/MOSCOW
117977//RUSSIA/
Journal: EXPERIMENTAL GERONTOLOGY, 1993, V28, N2 (MAR-APR), P169-180
ISSN: 0531-5565
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Abstract: The dynamics of life span (LS) and fecundity in *Drosophila melanogaster*, strain D-32, were **analyzed** in a series of successive generations. Highly reliable variations in both fitness components were found. On initial inspection the variations would be characterized as random...

...Research Fronts: DIFFERENTIATION; BIOCHEMICAL SYSTEMATICS; ALLOZYME VARIABILITY; ISOZYME ELECTROPHORESIS)
91-1082 001 (NITROGENASE ACTIVITY; SOYBEAN NODULES; SYNECHOCOCCUS RF-1; N2 FIXATION; WHITE CLOVER)
91-2038 001 (LOCAL PREDICTION OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

17/3,K/19 (Item 17 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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02291507 Genuine Article#: KQ122 No. References: 42
Title: A REDUCTION IN THE CORRELATION DIMENSION OF HEARTBEAT INTERVALS PRECEDES IMMINENT VENTRICULAR-FIBRILLATION IN HUMAN-SUBJECTS
Author(s): SKINNER JE; PRATT CM; VYBIRAL T
Corporate Source: METHODIST HOSP,CARDIOL SECT,MSF 905,6535
FANNIN/HOUSTON//TX/77030; BAYLOR COLL MED,DEPT NEUROL,NEUROPHYSIOL SECT/HOUSTON//TX/77030; BAYLOR COLL MED,DEPT MED,CARDIOL SECT/HOUSTON//TX/77030
Journal: AMERICAN HEART JOURNAL, 1993, V125, N3 (MAR), P731-743
ISSN: 0002-8703
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Abstract: Reduced reflexive control of heartbeat intervals occurs with advanced heart disease and is an independent risk factor for **mortality**. Based on a previous study of experimental myocardial infarction in pigs, we hypothesized that a deterministic measure of heartbeat dynamics, the correlation dimension of R-R intervals (D2), may be a better **predictor** of risk than a stochastic measure, such as the standard deviation (SD). We determined the point estimates of the heartbeat D2 (i.e., PD2s) in...

...Identifiers--ACUTE MYOCARDIAL-INFARCTION; RATE-VARIABILITY; SUDDEN-DEATH; BAROREFLEX SENSITIVITY; PERIOD VARIABILITY; MORTALITY; ARRHYTHMIAS; BLOCKADE; DYNAMICS; BRAIN
Research Fronts: 91-0455 003 (HEART-RATE IN DIABETIC AUTONOMIC NEUROPATHY; RESPIRATORY SINUS ARRHYTHMIA; POWER SPECTRAL - ANALYSIS ; CARDIAC VAGAL TONE; CARDIOVASCULAR REFLEX RESPONSES)
91-2038 001 (LOCAL PREDICTION OF CHAOTIC TIME-SERIES; NONLINEAR

DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

17/3,K/20 (Item 18 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
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02263910 Genuine Article#: KP403 No. References: 33
Title: A MATHEMATICAL-MODEL OF THE EFFECT OF SHOOTING BARNACLE GEESE WINTERING ON ISLAY
Author(s): MIDDLETON DAJ; NISBET RM; KERR AJ
Corporate Source: UNIV STRATHCLYDE,DEPT STAT & MODELLING SCI,LIVINGSTONE TOWER,26 RICHMOND ST/GLASGOW G1 1XH//SCOTLAND/; NAT CONSERVANCY COUNCIL SCOTLAND/BALLOCH G83 8LX/DUNBARTON/SCOTLAND/
Journal: JOURNAL OF APPLIED ECOLOGY, 1993, V30, N1, P1-12
ISSN: 0021-8901
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: capacity. We consider both situations but investigate the former in detail as this is likely to lead to increasing conflict with agriculture.

3. Simple deterministic **analysis** demonstrates that, where there is no natural density dependence over the relevant range of densities, only those shooting strategies which impose density-dependent **mortality** on the population can control numbers effectively while maintaining a viable population.

4. **Analysis** with the incorporation of environmentally driven variation establishes that strategies based on shooting a fixed proportion of the excess of females over some threshold in...

...drop to low numbers.

5. Low levels of auto-correlation in the recruitment rate or of correlation between the birth rate and year-to-year **survival** do not greatly affect the distribution of times taken to reach low numbers; however, higher levels of either result in a decrease in the modal...

...Identifiers--FLUCTUATING ENVIRONMENT; NATURAL-POPULATIONS; DENSITY DEPENDENCE; EXTINCTION; DYNAMICS; **SURVIVAL**; SCOTLAND; WILDFOWL; RATES Research Fronts: 91-1018 002 (GREATER SNOW GEESE; BARNACLE GOOSE BRANTA-LEUCOPSIS; BODY SIZE; SPRING STAGING)
91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)
91-3807 001 (DEMOGRAPHIC GROWTH **ANALYSIS** ; DYNAMICS OF AGE-STRUCTURED POPULATIONS; TESTING LIFE-CYCLE THEORY; LESLIE SYSTEMS; CLONAL REPRODUCTION)
91-5768 001 (SPRUCE BUDWORM; INSECT POPULATIONS; TIME-VARYING **SURVIVAL** RATES)

17/3,K/21 (Item 19 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02263898 Genuine Article#: KP402 No. References: 42
Title: DYNAMICS OF A MATHEMATICAL-MODEL OF CHRYSOMYA-MEGACEPHALA (DIPTERA, CALLIPHORIDAE)
Author(s): VONZUBEN CJ; DOSREIS SF; DOVAL JBR; GODOY WAC; RIBEIRO OB
Corporate Source: UNIV ESTADUAL PAULISTA/BR-13506 RIO CLARO/SP/BRAZIL/; UNIV ESTADUAL CAMPINAS,INST BIOL,DEPT PARASITOL/BR-13100

CAMPINAS/SP/BRAZIL/
Journal: JOURNAL OF MEDICAL ENTOMOLOGY, 1993, V30, N2 (MAR), P443-448
ISSN: 0022-2585
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

Abstract: The laboratory population dynamics of *Chrysomya megacephala* (F.) was explored with a mathematical model of density-dependent growth. Fecundity and **survival** decreased significantly as a function of larval density. Parameters in the exponential regressions fitted to the fecundity and **survival** data were incorporated into a finite-difference equation that incorporates the delayed effect of larval density on fecundity and **survival** of adults. The theoretical population model of *C. megacephala* showed cyclic behavior with a stable limit cycle of two points for adults and immatures.

Research Fronts: 91-0609 001 (GAMES OF PERFECT INFORMATION; SEQUENTIAL EQUILIBRIUM; RATIONAL DETERRENCE; INCENTIVES FOR MONITORING QUALITY; EVOLUTIONARY STABILITY)
91-2038 001 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)

17/3, K/22 (Item 20 from file: 34)
DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
(c) 2004 Inst for Sci Info. All rts. reserv.

02205517 Genuine Article#: KK190 No. References: 30
Title: CHAOTIC POPULATION-DYNAMICS CAN RESULT FROM NATURAL-SELECTION
Author(s): FERRIERE R; GATTO M
Corporate Source: ECOLE NORM SUPER,CNRS,URA 258,ECOL LAB,46 RUE ULM/F-75230 PARIS 05//FRANCE//; POLITECN MILAN,CNR,CTR TEORIA SISTEMI/I-20133 MILAN//ITALY//
Journal: PROCEEDINGS OF THE ROYAL SOCIETY OF LONDON SERIES B-BIOLOGICAL SCIENCES, 1993, V251, N1330 (JAN 22), P33-38
ISSN: 0962-8452
Language: ENGLISH Document Type: ARTICLE (Abstract Available)

...Abstract: as well as oscillations. We have tested for this hypothesis by considering the dynamics associated with evolutionarily stable life histories (including age of maturity, adult **survivorship** and recruitment to adulthood) in a simple, but general, demographic model. Contrary to expectation, individual selection operating on demographic traits should often lead to oscillatory...

...of maturity and many age classes. Also, the optimality of chaos is more likely whenever trade-offs constrain recruitment to rapidly decrease with increasing adult **survival** or decreasing age of maturity. Our results bring evolutionary support to the possibility that chaotic population dynamics might be much more widespread than inferred until now from data **analyses**. Furthermore, these findings provide novel support for the view that chaos could be an optimal regime for several biological systems.

Research Fronts: 91-2038 003 (LOCAL **PREDICTION** OF CHAOTIC TIME-SERIES; NONLINEAR DELAYED FEEDBACK; DYNAMIC SYSTEM; LYAPUNOV SPECTRUM)
91-0609 001 (GAMES OF PERFECT INFORMATION; SEQUENTIAL EQUILIBRIUM; RATIONAL DETERRENCE; INCENTIVES FOR MONITORING QUALITY; EVOLUTIONARY STABILITY)
91-0838 001 (LARVAL GROWTH OF A MARINE FISH; WINTER FLOUNDER PSEUDOPLEURONECTES-AMERICANUS REPRODUCTIVE SUCCESS; FEMALE SIZE; FLUIDIZED-BED REACTOR; EARLY LIFE-HISTORY)
91-3807 001 (DEMOGRAPHIC GROWTH **ANALYSIS**; DYNAMICS OF AGE-STRUCTURED

POPULATIONS; TESTING LIFE-CYCLE THEORY; LESLIE SYSTEMS; CLONAL
REPRODUCTION)

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ANSWER 13 OF 20 LIFESCI COPYRIGHT 2004 CSA on STN
ACCESSION NUMBER: 1999:103856 LIFESCI
TITLE: Selection pressures on vital rates in density-dependent populations
AUTHOR: Grant, A.
CORPORATE SOURCE: School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, UK
SOURCE: Proceedings of the Royal Society of London, Series B: Biological Sciences [Proc. R. Soc. Lond., Ser. B: Biol. Sci.], (19970300) vol. 264, no. 1380, pp. 303-306.
ISSN: 0962-8452.
DOCUMENT TYPE: Journal
FILE SEGMENT: D
LANGUAGE: English
SUMMARY LANGUAGE: English
AB For density-independent populations, the sensitivity of population growth rate to changes in individual vital rates indicates the strength of selection on different parts of the life history. Here I show how this approach may be extended to any density-dependent and/or stochastic population model, including those that show cyclic, quasi-periodic and chaotic dynamics. One calculates the influence of individual vital rates on the outcome of competition between two almost identical life histories. The outcome of this competition is determined by the invasion exponent theta introduced by Rand. This is the Lyapunov exponent of the linearized system describing the invasion of a population with one life history by a variant type with another. Demographic sensitivities are given by the partial derivatives of theta with respect to the individual vital rates of the invading type. The density-independent analysis is a special case of this general framework. Sensitivities can often be obtained analytically when the population has a stable equilibrium point, and can be calculated by numerical differentiation in other cases. One can also use the methodology to examine selection pressures on the parameters describing density dependence and, if there are trade-offs between vital rates, it can be used to determine optimal life histories. A two age-class example shows that the occurrence of nonlinear dynamics can markedly alter selection pressures on a life history from those which operate when the population has a stable equilibrium point.

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ANSWER 7 OF 20 HCAPLUS COPYRIGHT 2004 ACS on STN
ACCESSION NUMBER: 2000:650218 HCAPLUS
TITLE: **Analyzing Lyapunov spectra**
of chaotic dynamical systems
AUTHOR(S): Diakonos, F. K.; Pingel, D.; Schmelcher, P.
CORPORATE SOURCE: Department of Physics, University of Athens, Athens,
GR-15771, Greece
SOURCE: Physical Review E: Statistical Physics, Plasmas,
Fluids, and Related Interdisciplinary Topics (2000),
62(3-B), 4413-4416
CODEN: PLEEE8; ISSN: 1063-651X
PUBLISHER: American Physical Society
DOCUMENT TYPE: Journal
LANGUAGE: English
AB It is shown that the asymptotic spectra of finite-time Lyapunov exponents of a variety of fully chaotic dynamical systems can be understood in terms of a statistical anal. Using random matrix theory, we derive numerical and in particular, anal. results that provide insights into the overall behavior of the Lyapunov exponents particularly for strange attractors. The corresponding distributions for the unstable periodic orbits are investigated for comparison.
REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

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ANSWER 1 OF 3 LIFESCI COPYRIGHT 2004 CSA on STN
ACCESSION NUMBER: 2001:39178 LIFESCI
TITLE: Periodic dynamics in Daphnia populations: Biological interactions and external forcing
AUTHOR: Grover, J.P.; McKee, D.; Young, S.; Godfray, H.C.J.; Turchin, P.*
CORPORATE SOURCE: Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, Connecticut 06269-3043, USA
SOURCE: Ecology, (2000) vol. 81, no. 10, pp. 2781-2798.
ISSN: 0012-9658.
DOCUMENT TYPE: Journal
FILE SEGMENT: D
LANGUAGE: English
SUMMARY LANGUAGE: English
AB Populations of the freshwater crustacean Daphnia were grown in laboratory microcosms for nearly 2 yr, to assess periodicity and other features of population dynamics. Two experimental manipulations were imposed: the addition of other crustacean species and imposition of externally forced temperature variations. Linear time series analysis revealed cyclic dynamics, with periods ranging from 41 to 182 d. Periodic behavior was qualitatively robust to both experimental manipulations. It occurred in populations of *D. pulicaria* in microcosms with and without additional species of crustaceans, and it occurred in populations of *D. magna* with and without externally imposed oscillations in temperature. Periodicity was observed both in populations that persisted and in those that went extinct during the experiment. The experimental treatment of additional crustacean species, and perhaps that of temperature forcing, reduced the period of oscillation. For the longest time series, nonlinear autoregression techniques gave negative Lyapunov exponents, consistent with stable but noisy periodic dynamics rather than chaotic dynamics. Periodic models with a single fundamental frequency typically did not capture all the periodic behavior, however, suggesting that additional frequencies or responses to demographic stochasticity were present.

L29 ANSWER 2 OF 3 LIFESCI COPYRIGHT 2004 CSA on STN
ACCESSION NUMBER: 1998:89964 LIFESCI
TITLE: Noise and Nonlinearity in Measles Epidemics: Combining Mechanistic and Statistical Approaches to Population Modeling
AUTHOR: Ellner, S.P.; Bailey, B.A.; Bobashev, G.V.; Gallant, A.R.; Grenfell, B.T.; Nychka, D.W.
CORPORATE SOURCE: Biomathematics Program, Department of Statistics, North Carolina State University, Raleigh, NC 27695-8203, USA
SOURCE: Am. Nat., (1998) vol. 151, no. 5, pp. 425-440.
ISSN: 0003-0147.
DOCUMENT TYPE: Journal
FILE SEGMENT: V
LANGUAGE: English
SUMMARY LANGUAGE: English
AB We present and evaluate an approach to analyzing population dynamics data using semimechanistic models. These models incorporate reliable information on population structure and underlying dynamic mechanisms but use nonparametric surface-fitting methods to avoid unsupported assumptions about the precise form of rate equations. Using historical data on measles epidemics as a case study, we show how this approach can lead to better forecasts, better characterizations of the dynamics, and a better understanding of the factors causing complex population dynamics relative to either mechanistic models or purely descriptive statistical time-series

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models. The semimechanistic models are found to have better forecasting accuracy than either of the model types used in previous analyses when tested on data not used to fit the models. The dynamics are characterized as being both nonlinear and noisy, and the global dynamics are clustered very tightly near the border of stability (dominant **Lyapunov exponent lambda** approximately 0). However, locally in state space the dynamics oscillate between strong short-term stability and strong show-term chaos (i.e., between **negative** and positive local **Lyapunov exponents**). There is statistically significant evidence for short-term chaos in all data sets examined. Thus the nonlinearity in these systems is characterized by the variance over state space in local measures of chaos versus stability rather than a single summary measure of the overall dynamics as either chaotic or nonchaotic.

L29 ANSWER 3 OF 3 LIFESCI COPYRIGHT 2004 CSA on STN
ACCESSION NUMBER: 97:88370 LIFESCI
TITLE: Nonlinear time-series modeling of vole population fluctuations
AUTHOR: Turchin, P.
CORPORATE SOURCE: Dep. Ecol. and Evolution. Biol., Univ. Connecticut, Storrs, CT 06269-3042, USA
SOURCE: RES. POPUL. ECOL., (1996) vol. 32, no. 2, pp. 121-132.
Meeting Info.: 17. Symposium of the Society of Population Ecology. Yunoyama-onsen (Japan). 30 Sep-2 Oct 1995.
ISSN: 0034-5466.
DOCUMENT TYPE: Journal
TREATMENT CODE: Conference
FILE SEGMENT: D
LANGUAGE: English
SUMMARY LANGUAGE: English
AB A central goal of population ecology is to understand and predict fluctuations in population numbers. Until recently, much of the debate focused on the issue of population regulation by density-dependent factors. In this paper, I describe an approach to nonlinear modeling of time-series data that is designed to go beyond this question by investigating the possibility of complex population dynamics, characterized by lags in regulation and periodic or chaotic oscillations. The questions motivating this approach are: what are relative contributions of endogenous vs. exogenous components of dynamics? Is the irregular component in fluctuations entirely due to exogenous noise, or do nonlinearities contribute to it, too? I describe the philosophy and the technical details of the nonlinear modeling approach, and then apply it to a collection of time-series data on vole population fluctuations in northern Europe. The results suggest that population dynamics of European voles undergo a latitudinal shift from stability to chaos. Dynamics in northern Fennoscandia are characterized by positive **Lyapunov exponent** estimates, and a high degree of short-term (one year ahead) predictability, suggesting a strong endogenous component. In more southerly populations estimated **Lyapunov exponents** are **negative**, and there is no one-step ahead predictability, suggesting that fluctuations are driven by exogenous factors.

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(FILE 'HOME' ENTERED AT 11:53:25 ON 10 SEP 2004)

FILE 'MEDICONF, BIOTECHNO, HCAPLUS, LIFESCI' ENTERED AT 11:56:25 ON 10 SEP 2004

L1 2111 S LYAPUNOV
L2 13178 S EXPONENT!
L3 400738 S SURVIV? OR MORTALIT?
L4 1289492 S SPECTRA?
L5 4112803 S ANALYS? OR ANALYZ? OR PREDICT?
L6 97979 S OUTCOME?
L7 14584 S ICU OR INTENSIVE() CARE
L8 72 S L1(3N) L5
L9 712 S L1() L2
L10 42768 S L4(3N) L5
L11 0 S L1 AND L7
L12 10 S L1 AND L3
L13 4 S L1 AND L6
L14 16 S L1 AND L10
L15 8719 S PATIENT?(3N) L6
L16 0 S L1 AND L15
L17 1 S L10 AND L15
L18 21 S L13 OR L14 OR L17
L19 20 DUP REMOVE L18 (1 DUPLICATE REMOVED)
L20 1883700 S ANAL
L21 57297 S L4(5N) L20
L22 19 S L1 AND L21
L23 16 S L22 NOT L18
L24 0 S L3 AND L23
L25 0 S L15 AND L23
L26 0 S L6 AND L23
L27 0 S L7 AND L23
L28 279000 S NEGATIVE?
L29 3 S L1 AND (L2(5N) L28)
L30 0 S L3 AND L29

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S2	30171	LYAPUNOV
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S4	232576	INTENSIVE() CARE
S5	45545	ICU
S6	248476	S4 OR S5
S7	3	S2 AND S6
S8	14557287	PREDICT? OR ANALYS? OR ANALYZ?
S9	10705	S2 AND S8
S10	2657754	SURVIV? OR MORTAL?
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S14	11764062	PY=(2001 OR 2002 OR 2003 OR 2004)
S15	79	S12 NOT S14
S16	4110894	SPECTR?
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S19	3	RD (unique items)
S20	10859	S2() EXPONENT?
S21	565353	S16(3N)S8
S22	9	S20 AND S21 AND S10
S23	6	S22 NOT S15
S24	6	RD (unique items)
S25	162	NEGATIVE(3N)S20
S26	1590058	OUTCOME? ?
S27	0	S25 AND S26
S28	0	S10 AND S25
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